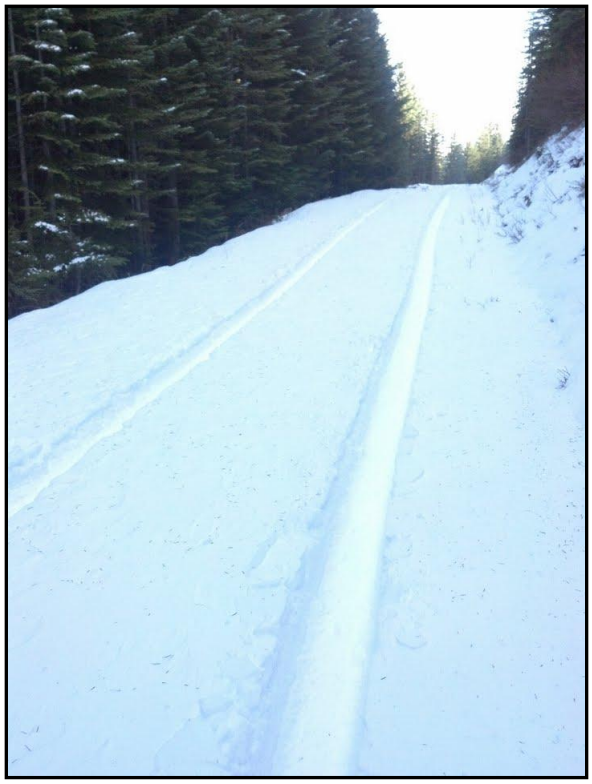
2012

Restoration Thinning (As-Built) Project Report

Cedar River Municipal Watershed



Restoration Thinning Project Team,
Watershed Services Division,
Seattle Public Utilities:

Bill Richards
Amy LaBarge
Wendy Sammarco
Chris Raynham
Jayme Clark

1.0 Background

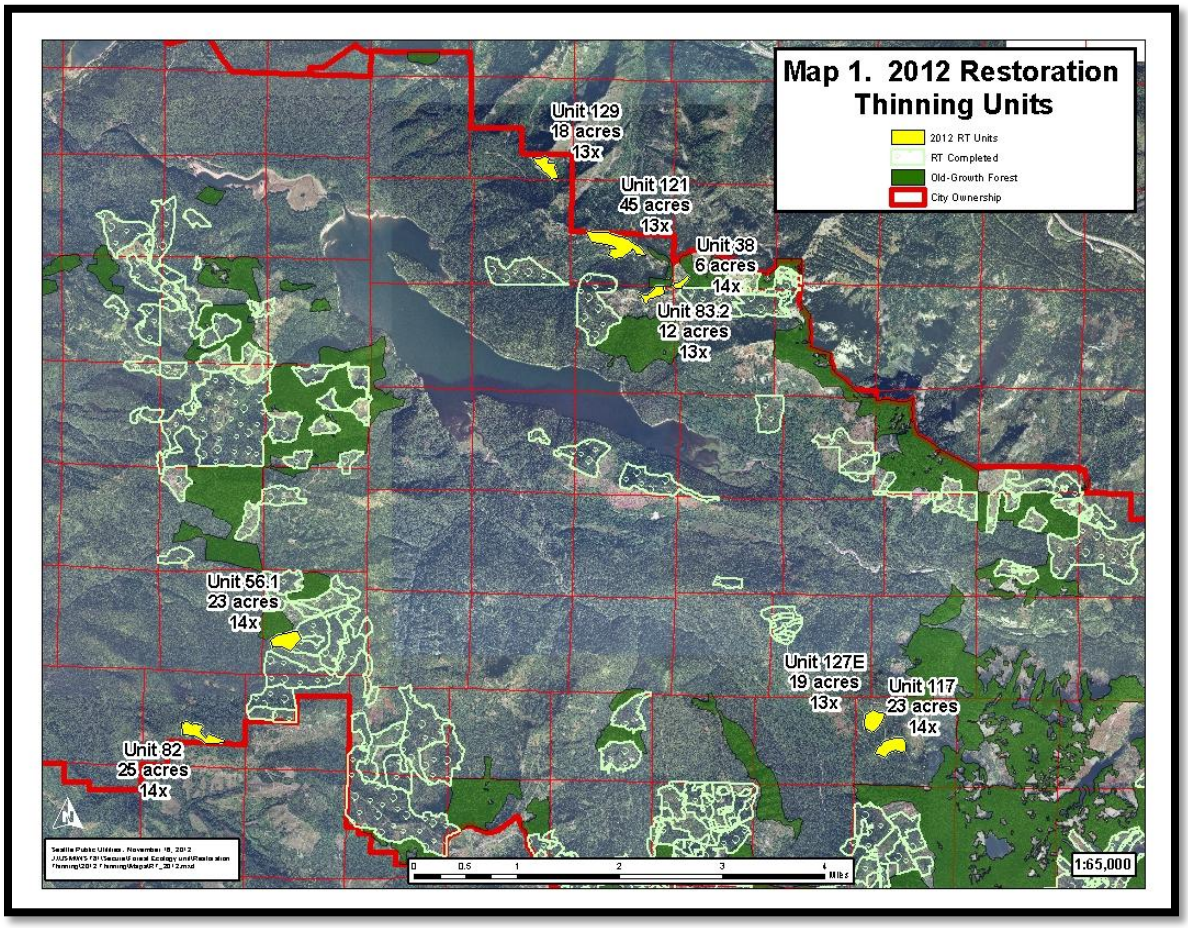
Upland Restoration Thinning (RT) is the active ecologically-driven treatment of relatively young and dense second-growth forests that have relatively low biological diversity and are in or approaching the competitive exclusion stage of forest succession. The RT program in the Cedar River Municipal Watershed (CRMW) was established by the Cedar River Watershed Habitat Conservation Plan (CRW-HCP) in the year 2000 with the goal of developing complex habitat and accelerating late-successional forest habitat characteristics. Prior to that time, an analogous pre-commercial thinning program treated young forest stands in the CRMW with commercial forestry goals (e.g., maximizing individual tree growth for future harvest by creating evenly spaced trees, often of a single species). The RT program is defined more specifically in the Cedar River Municipal Watershed Upland Forest Habitat Restoration Strategic Plan (2008), and treatment priorities are specified in the Landscape Synthesis Framework for the Cedar River Watershed Habitat Conservation Plan (2009). Through the planning process that developed these detailed documents, RT treatment units were identified based on their current age, height, and stand condition, and prioritized based on their proximity to highly valued habitat (e.g., old-growth forest, riparian, and wetland areas).

RT projects have been implemented in the CRMW since 2000, with planning and implementation occurring on an annual cycle. Treatment prescriptions have evolved through an adaptive management process as project monitoring informs whether goals and objectives are being attained. Budgeting for RT projects under the CRW-HCP is scheduled to sunset in 2015, defining an implementation schedule and treatment quota. This plan provides descriptions and treatment plans for individual forest units identified for treatment in 2012. The RT budget and area of treatment target for 2012 was $150,000 and approximately 450 acres, respectively.

1.1 2012 RT Project Overview

The areas prioritized for RT in 2012 were young forest stands on the ridge north of Chester Morse Lake (in the 110, 120, and 150 road systems) and the ridge running northwest from Findley Lake (in the 300 road system). The north ridge can be characterized as a relatively high elevation, steep, south-facing slope that has variably recovered from clearcut timber harvest, with large areas of patchy tree distribution that would not necessarily benefit from RT. The 300 road system is similar in elevation and variability. Twenty-four RT units (534 acres) were identified in these areas for treatment through the Landscape Synthesis Framework and validated through extensive site recognizance. A significant portion of these units was set aside as unthinned reserves (918 acres) because they did not meet RT treatment criteria (e.g., the tree density was low, trees were too big, erosion concerns, location on the landscape). During the same process, fifteen other units (648 acres) were designated as unthinned reserves for these same reasons. Higher ranked units on the landscape have primarily previously been treated.

External factors severely limited the implementation of RT in 2012. First, late-season snow limited access to potential units until June/July, when identifying, marking, collecting data, and developing prescriptions could commence. Second, seasonal restrictions limit RT activity adjacent to potential nesting of sensitive wildlife species (e.g., northern spotted owl, marbled murrelet, northern goshawk) until after August 31st. Third, the high fire hazard precipitated by the late-summer/early fall drought prohibited RT activity until the rains returned at the end of October. And finally, snow returned to limit access to the units in mid-November. All told, RT crews worked 12 days, completing only eight of the units (171 acres – Map 1). The remaining 16 units (363 acres), which have already been awarded to a treatment contractor (Ramirez Reforestation), will be deferred until 2013.



2.0 Goals and Objectives

The overarching goal of RT is to accelerate the development of complex habitat in the near-term and late-successional and old-growth forest conditions in the long-term. Objectives of RT include:

- Reduce competition among trees.
- Stimulate tree growth.
- Increase light penetration under the top tree canopy.
- Increase tree and understory plant species diversity.
- Accelerate forest development beyond the competitive exclusion stage towards a more biologically diverse stage.
- Extend the forest development stand initiation stage such that diverse species become established and diverse stand structures develop.
- Reduce long-term fire hazard.
- Increase resilience to catastrophic windthrow, insect, or disease outbreak.

Additional ecological objectives considered in 2012, including methods developed to achieve those objectives are to:

- Provide multiple development pathways for variable forest stand structures.
    - Variable residual tree densities and tree sizes; stand scale reserves; numerous skips.
- Increase connectivity and structural variability of riparian areas; minimize sediment from entering streams.
    - Buffer or retain higher tree densities along streams and inner gorges.

2.1 Landscape Perspective

Each unit can be characterized by its unique features and how it relates to other features on the landscape. The north ridge, for example, contains many unique features such as talus slopes, rock outcroppings, and shrub openings, as well as stands of old-growth forests adjacent to and within the landscape planning area. Three key landscape criteria shaped the thinking behind individual thinning prescriptions including decisions to place areas in reserve status:

- Individual unit objectives and unique features, i.e. What special characteristics does a particular unit have when compared to other units and how should the unit objectives be tailored to protect, enhance, and promote those features?
- The location and characteristics of old-growth forests and special habitats relative to the thinning units, i.e. What locations and characteristics of nearby old growth and special habitats are unique that we should consider them in the prescriptions?

- The proximity and location to previously thinned stands, i.e. What should be done differently now considering the prescriptions and ecological response of nearby previously thinned stands?

Additional details can be found on the maps of each thinning unit later in this report.

3.0 Costs, Area Treated, and Compliance

For 2012, the total area treated was 171 acres at a cost of $34,987.00 for an average cost per acre of $204.60 (Table 1). All work was paid at an hourly rate that was bid prior to the start of work. A not-to-exceed (NTE) amount was established at 133% of the respective contractors winning bid price. All work was completed for less than the overall NTE amount.

Compliance plots were measured at a density of at least one plot for every two acres of treatment with a minimum of five plots per unit. Plots were intended to be distributed throughout the unit. Treatment quality exceeded 90% for each unit, which is the contractual threshold for full payment.

Table 1. Costs, acres, treatment quality by unit for 2012 Restoration Thinning.

Unit	Acres	Cost ($)		% Quality
		Total	Cost/Acre	
56.1	23	11,700.50	243.76	100.0
82	25			100.0
38	6	13,766.50	169.96	92.1
83.2	12			93.3
121	45			93.8
129	18			97.7
117‡	23	5,020.00	218.26	90.1
127E‡	19	4,095.00	215.53	91.7
Total	**171**	**34,987.00**	**204.60**	**94.1**

‡Contracted to Ramirez Reforestation, all others to Coronel Reforestation. All work was conducted by Coronel Reforestation, either as a prime or subcontractor.

4.0 Unit Summaries

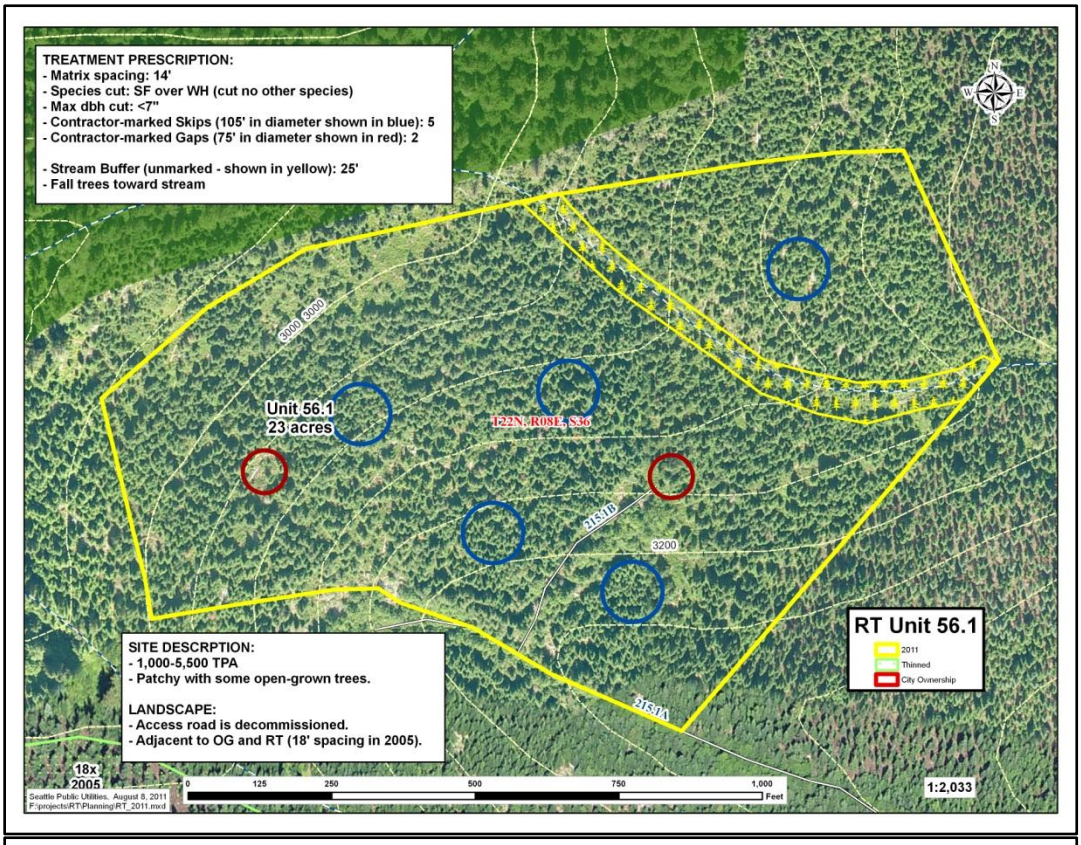
This section provides the following information specific to each unit. Table 2 summarizes unit information, treatments, and post-thinning tree densities. The table also shows information for units deferred until 2013 and units designated as reserve (or untreated). The following are eight maps showing the thinned units.

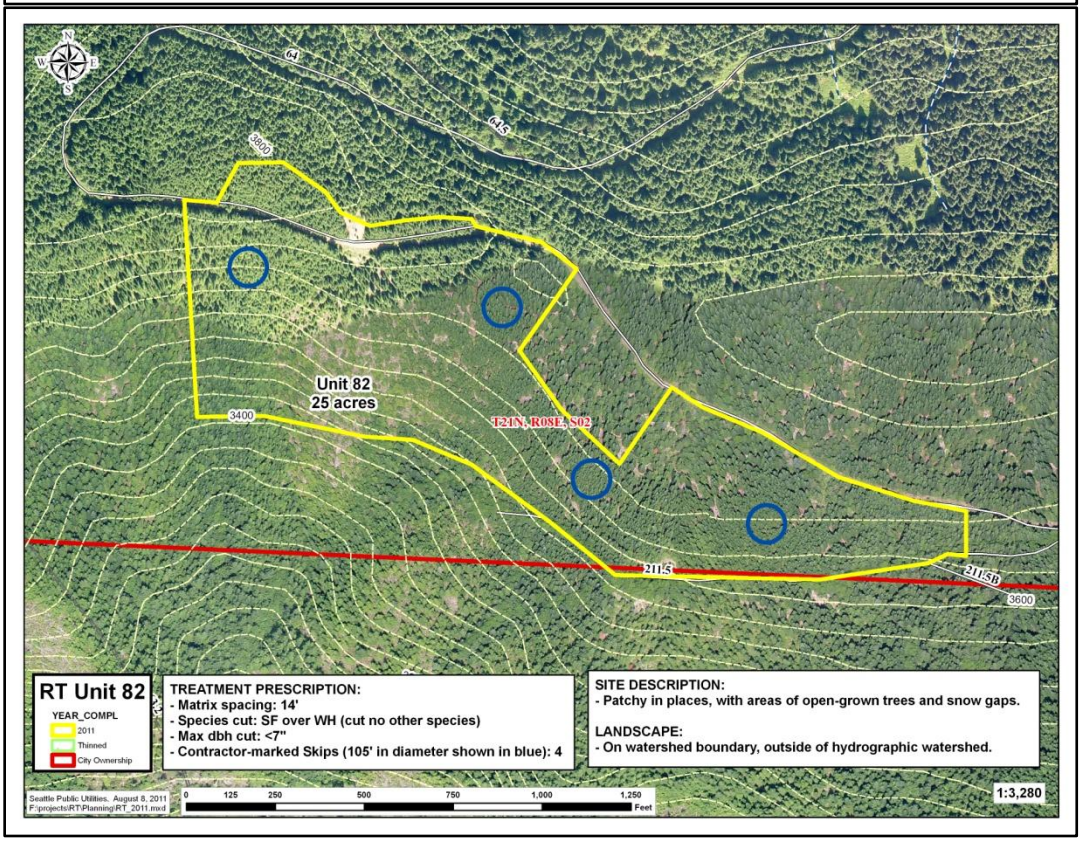
Table 2. 2012 restoration thinning unit data.

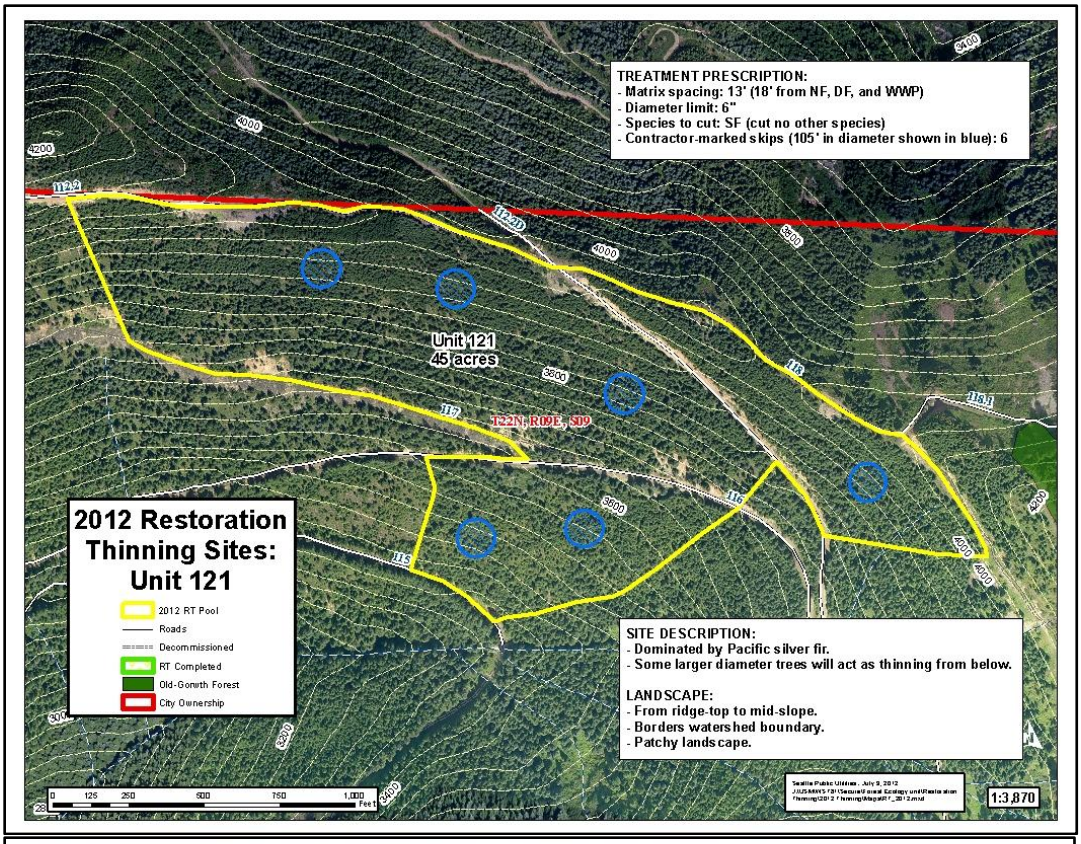
Treatment	Unit	Acres			Location			Elevation (')	Road Access	Pretreatment TPA	Thin Spacing			Internal Skips				Gaps	Prescription Comments	Compliance		Post-Thinning Matrix Trees/Acre (TPA)								
		Total	Treatment	Reserve	T	R	S				Spacing (')	Species Cut	Max dbh (")	# Circles (105' diam)	Buffer Acres	Total Acres	% of Unit	(75' diam)		# Plots	Quality (%)	ABAM	TSHE	ABPR	THPL	PSME	TSME	Total	Minimum	Maximum
Thinned	56.1	23	23	0	22	8	36	2,960 - 3,280	215.1A	1,000 - 5,500	14	SF, WH	7	5	1.5	2.5	10.9	2	25' stream buffer; deferred from 2011.	3	100	183	167	0	33	17	17	417	350	500
	82	25	25	0	21	8	2	3,400 - 3,700	64	NA	14	SF, WH	7	4	0	0.8	3.2	0	Deferred from 2011.	7	100	329	57	0	64	0	0	450	350	750
	121	45	45	0	22	9	9	3,360 - 4,080	118	500 - 6,750	13/ 18	SF	6	6	0	1.2	2.7	0	Space 13' from SF, 18' from DF, NF, and WWP.	23	94	474	72	0	0	0	9	555	200	900
	129	18	18	0	22	9	5	3,920 - 4,320	112.2A	NA	13	SF	7	4	0	0.8	4.4	0		9	98	594	122	11	0	0	0	727	500	950
	38	18	6	12	22	9	10	3,920 - 4,480	127.2	1,250 - 6,750	14	SF	5	1	0	0.2	3.3	0	Area north of unit is not dense enough to thin.	5	92	650	20	0	0	10	0	680	250	1400
	83.2	12	12	0	22	9	16	4,080 - 4,440	116	NA	13/ 18	SF	6	2	0	0.4	3.3	0	Space 13' from SF, 18' from DF, NF, and WWP.	6	93	583	0	83	0	0	0	666	500	1150
	117	32	23	9	21	9	1	3,560 - 4,000	350, 352	1,500 - 6,000	14	SF	6	5	0	1.0	4.3	0	Area southwest of unit is too large to thin.	12	90	375	96	17	13	4	4	509	300	800
	127E	19	19	0	21	9	1	3,720 - 4,100	352	NA	13	SF	6	4	0	0.8	4.2	0		10	92	345	140	10	0	10	0	505	300	850
	Subtotal	192	171	21										31	1.5	7.7	4.5	2		75	94									
Deferred	21.4	61	14	47	22	10	19	3,560 - 4,240	155.5 D	500 - 5,500	13/ 18	SF	5	2	0	0.4	2.9	0	Space 13' from SF, 18' from DF, NF, and WWP.											
	28.2	41	17	24	22	10	20	3,510 - 4,240	155.5A	250 - 2,750	13	SF	6	3	0	0.6	3.5	0	Pull slash 10' from trail; pull slash on to 155.5A rd.											
	43	103	NA	NA	22	10	27, 34	3,440 - 4,680	155	250 - 1,750	14	SF	5	NA	0	NA	NA	0	Not marked in field; not yet awarded to contractor.											
	58	274	76	198	22	10	33	2,440 - 4,280	155, 154.1	1,200 - 5,000	15	SF, WH, DF	6	9	1.3	3.1	4.1	0	25' stream buffer; ignore trees above diameter limit; part of larger area.											
	84A	212	19	161	22	10	29	2,720 - 3,320	154.1	1,200 - 1,500	15	SF, WH, DF	6	4	0	0.8	4.2	0												
	84B		11		22	10	29, 32,	2,760 - 3,240	154.1	600 - 1,500	16	SF, WH, DF	6	3	0	0.6	5.5	0												
	84C		21		22	10	28	3,500 - 3,900	155	2,500 - 10500	13	SF	6	3	0	0.6	2.9	0												
	85	123	51	72	22	10	29	2,920 - 4,160	155	NA	13	SF	7	8	0	1.6	3.1	0	Pull slash 10' from trail.											
	73	47	18	29	21	10	6	3,080 - 3,800	320.5	NA	14	SF	5	2	0.9	1.3	7.2	0	Not flagged, use natural boundaries; 25' stream buffer.											
	104	201	15	186	21	9	1	2,300 - 4,080	320, 352.1	NA	14	SF	6	4	0	0.8	5.3	0	Part of larger very steep area.											
	127A	288	7	180	22	9	35	3,520 - 3,650	341.1	1,900 - 8,000	15	SF	6	1	0	0.2	2.9	0												
	127B		45		22	9	35	3,600 - 3,880	341.1	1,700 - 13,000	13	SF	6	6	0	1.2	2.7	0												
	127C		10		22	9	36	3,680 - 3,880	341.1	1,800 - 3,400	13	SF	5	3	0	0.6	6.0	0												
	127D		35		22	9	36	3,840 - 4,200	341.1, 352	NA	14	SF	5	6	0	1.2	3.4	0												
	127F		11		21	9	2	3,640 - 4,040	341.1	NA	16	SF, WH	6	2	0	0.4	3.6	0	Short walk-in from road.											
	131	13	13	0	22	9	35, 36	3,080 - 3,600	320	2,300 - 5,000	15	SF, WH	6	3	0	0.6	4.6	0	Space 13' from SF, 18' from DF, NF, and WWP.											
	Subtotal	1363	363	897										59	2.2	14.0	3.9	0	All deferred units have been awarded to Ramirez Reforestation except unit 43, which has yet to be marked.											

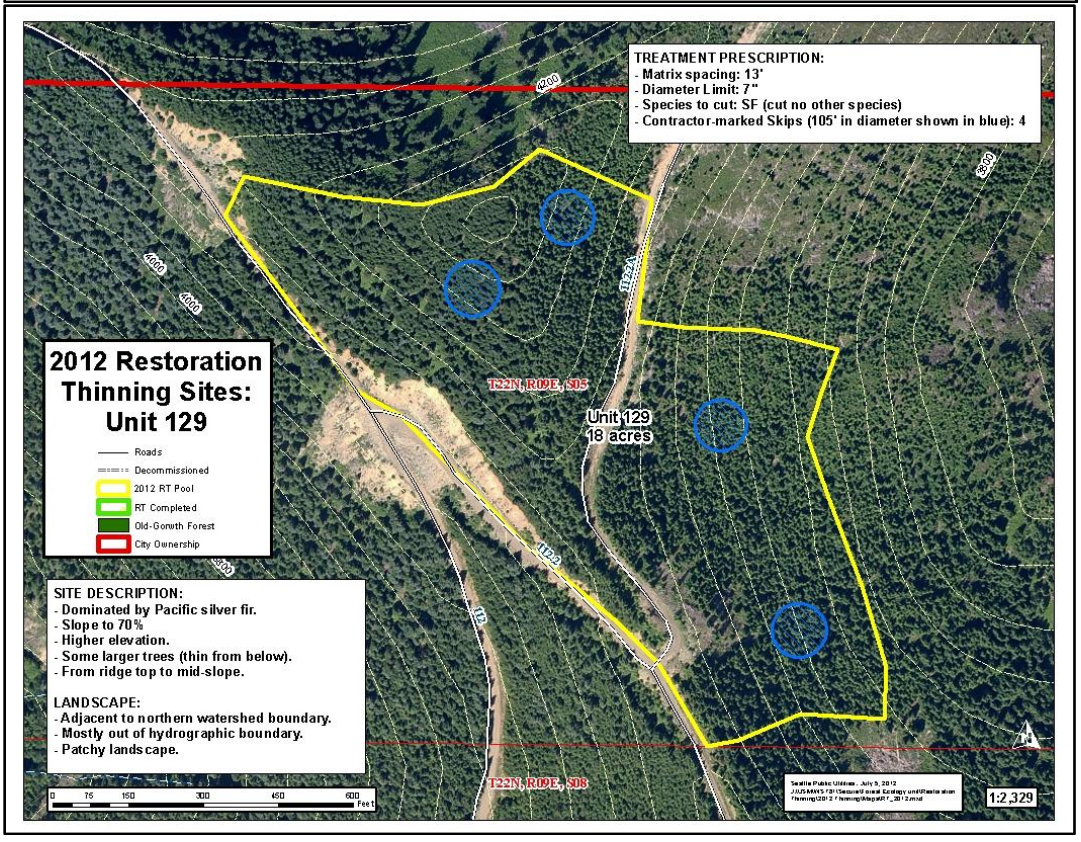
Reserved	**70**	7	0	7	22	8	11	2,520 - 2,960	800	NA	Trees are too large for RT.
	132	8	0	8	22	9	8	2,720 - 3,120	110	NA	Small unit that is 0.75 mile down a decommissioned road.
	133	15	0	15	22	9	8	2,480 - 3,320	110	NA	0.2 miles down decommissioned road.
	38.1	21	0	21	22	9	10	3,920 - 4,560	127.2	NA	Very low tree density.
	47.2	4	0	4	22	9	9	4,080 - 4,440	118	NA	Small unit in steep basin that is 0.25 miles down decommissioned road.
	83.1	12	0	12	22	9	16	3,360 - 4,000	116	NA	Already patchy and diverse.
	107	340	0	340	22	9	14, 15	2,760 - 4,600	125, 127.1A	NA	Patchy and sparse; high elevation; west-facing steep headwall.
	118	13	0	13	22	9	15	2,720 - 3,160	120	NA	Patchy; very steep headwall.
	43.2	58	0	58	22	10	27	3,840 - 4,680	155.9	NA	North of ridge is talus, brush, or low density trees; outside of hydrographic boundary.
	90.4	24	0	24	22	9	24	3,200 - 4,080	155.5	NA	1.25 miles behind road failure on the 155.5 road.
	114	28	0	28	22	10	32	2,120 - 2,440	154	NA	Patchy; 0.5 miles down decommissioned road.
	119	36	0	36	22	10	29, 32	2,240 - 2,760	154.1	NA	Already patchy; mostly DF, but with significant WWP and deciduous.
	72	13	0	13	22	9	36	2,350 - 2,680	320	NA	Primarily talus; end of decommissioned 392.2 road.
	98	10	0	10	21	9	1, 2	2,960 - 3,200	350	NA	Small area at end (1.0 mile) of decommissioned 360 road.
	116	59	0	59	22	9	34	2,640 - 3,160	310	0 - 1,400	Patchy tree density that would not benefit from thinning.
	Subtotal	**648**	**0**	**648**							
Total		**2203**	**534**	**1566**					90	3.7	21.7	4.1	2	

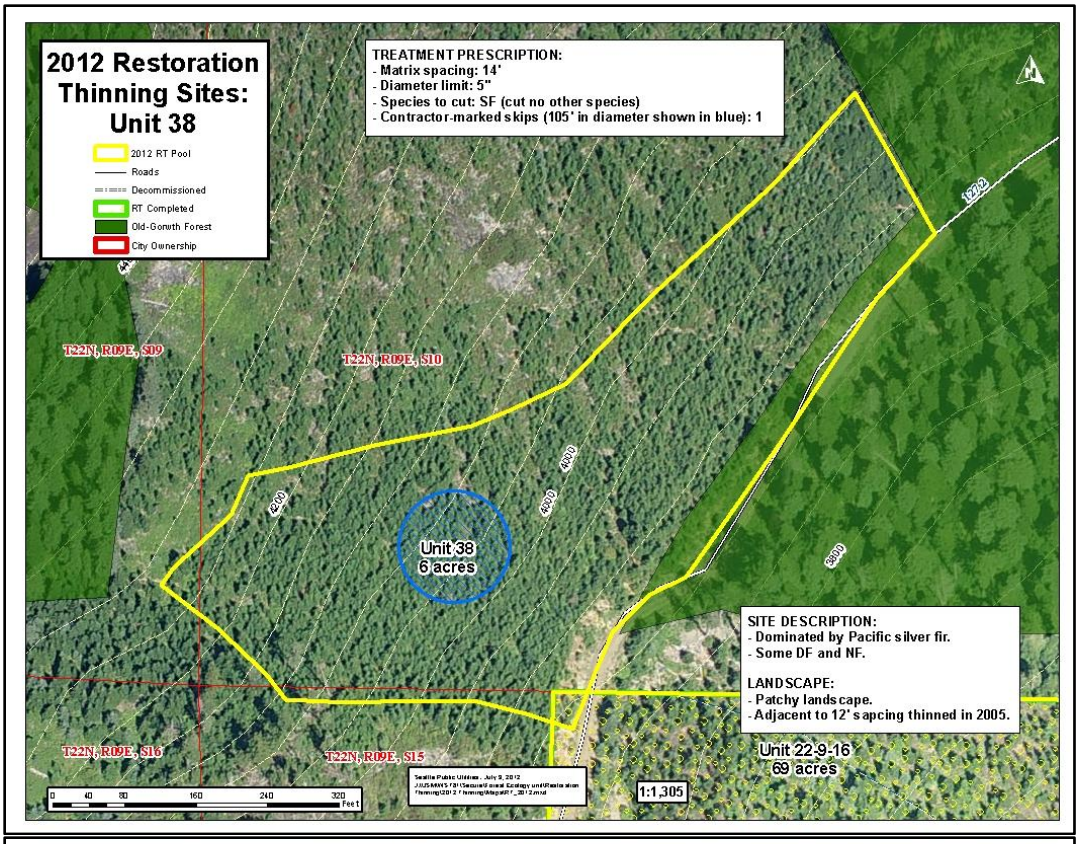
Maps of Thinned Units:

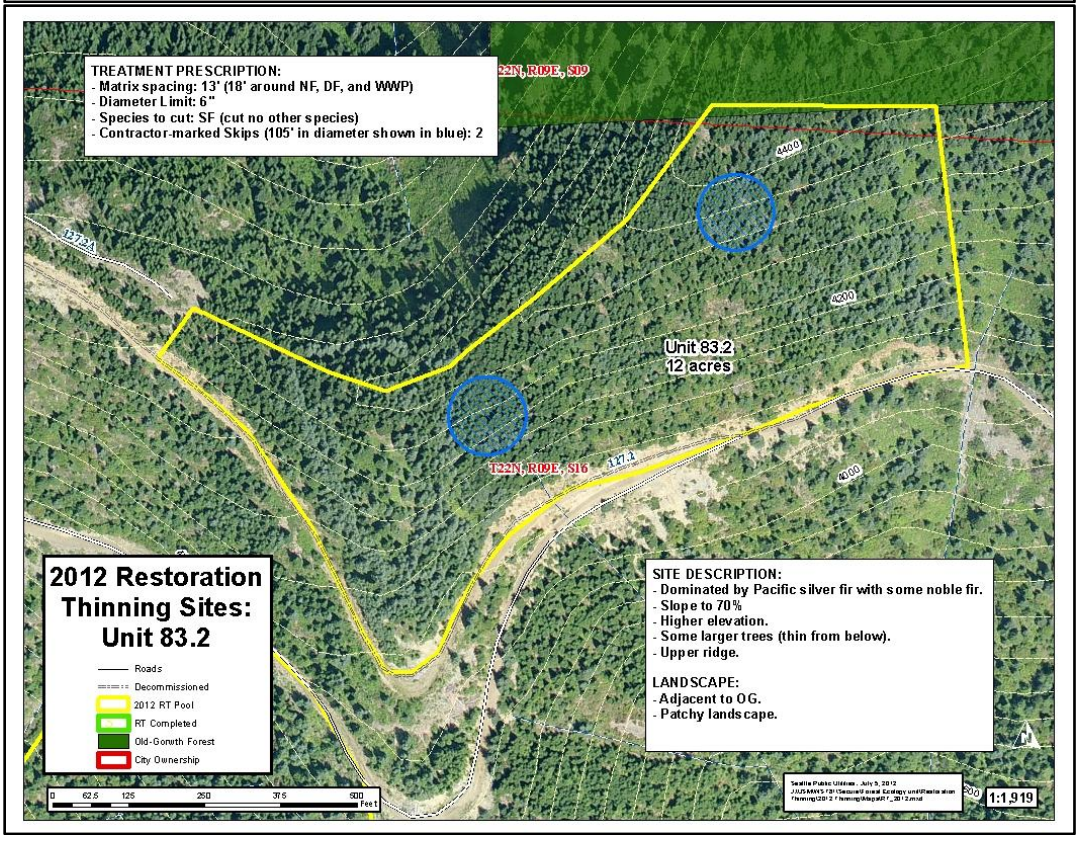


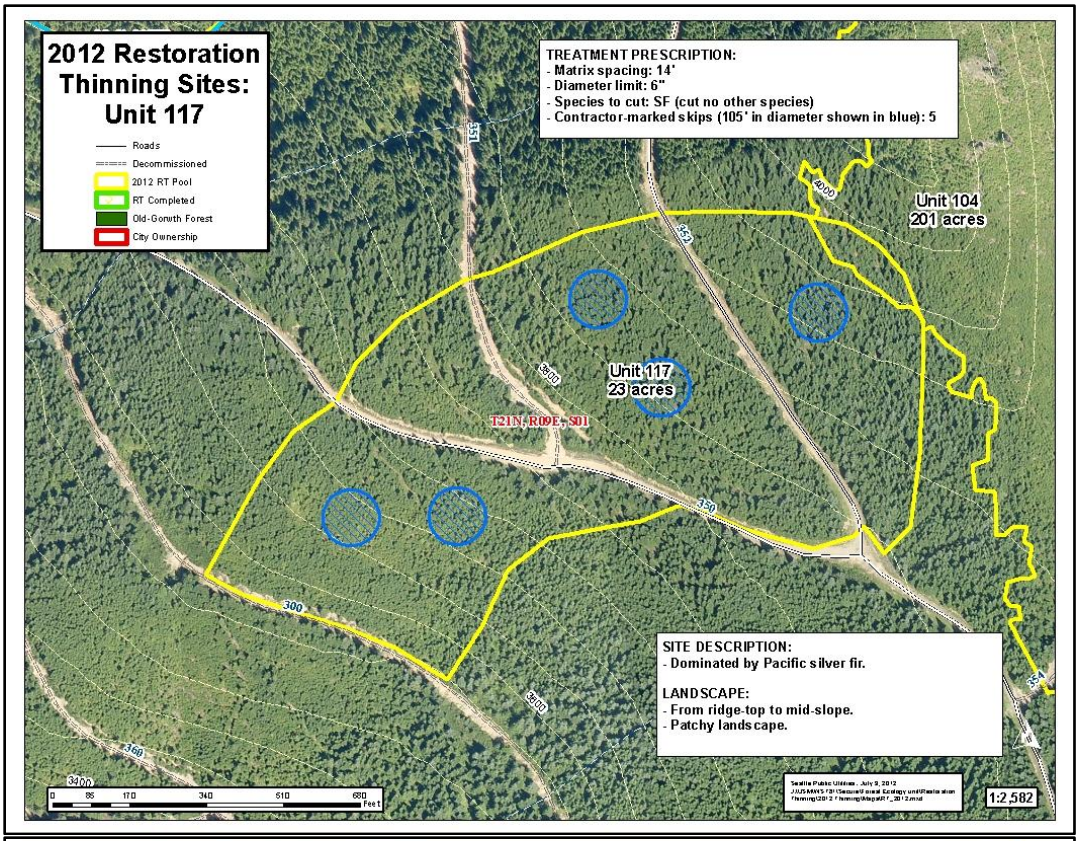


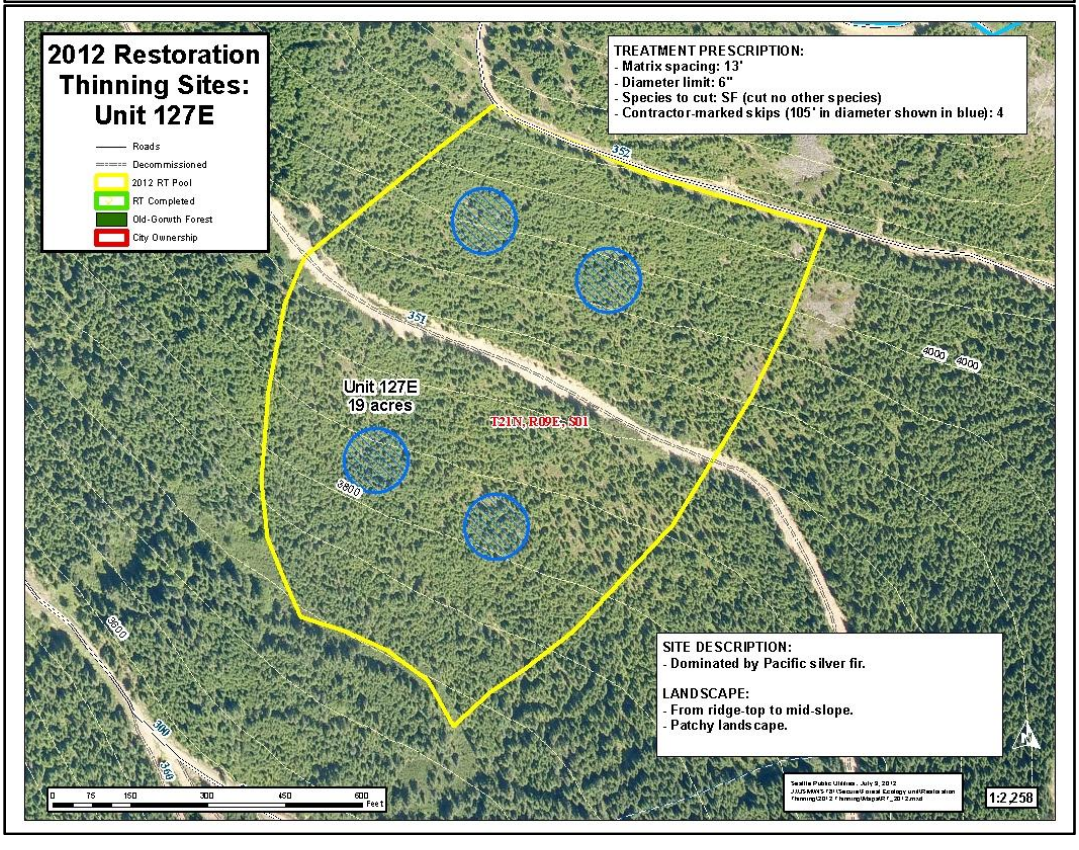

TREATMENT PRESCRIPTION:
- Matrix spacing: 13' (18' from NF, DF, and WWP)
- Diameter limit: 6"
- Species to cut: SF (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 6
Unit 121
45 acres
T22N, R09E, SD9
2012 Restoration Thinning Sites: Unit 121
2012 RT Pool
Roads
Decommissioned
RT Completed
Old-Growth Forest
City Ownership
SITE DESCRIPTION:
- Dominated by Pacific silver fir.
- Some larger diameter trees will act as thinning from below.
LANDSCAPE:
- From ridge-top to mid-slope.
- Borders watershed boundary.
- Patchy landscape.
1:3,870


TREATMENT PRESCRIPTION:
- Matrix spacing: 13'
- Diameter Limit: 7"
- Species to cut: SF (cut no other species)
- Contractor-marked Skips (105' in diameter shown in blue): 4
Unit 129
18 acres
T22N, R09E, SD5
T22N, R09E, SD8
2012 Restoration Thinning Sites: Unit 129
Roads
Decommissioned
2012 RT Pool
RT Completed
Old-Growth Forest
City Ownership
SITE DESCRIPTION:
- Dominated by Pacific silver fir.
- Slope to 70%
- Higher elevation.
- Some larger trees (thin from below).
- From ridge top to mid-slope.
LANDSCAPE:
- Adjacent to northern watershed boundary.
- Mostly out of hydrographic boundary.
- Patchy landscape.
1:2,329


2012 Restoration Thinning Sites: Unit 38
2012 RT Pool
Roads
Decommissioned
RT Completed
Old-Growth Forest
City Ownership
TREATMENT PRESCRIPTION:
- Matrix spacing: 14'
- Diameter limit: 5"
- Species to cut: SF (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 1
T22N, R09E, S09
T22N, R09E, S10
T22N, R09E, S16
T22N, R09E, S15
Unit 38
6 acres
SITE DESCRIPTION:
- Dominated by Pacific silver fir.
- Some DF and NF.
LANDSCAPE:
- Patchy landscape.
- Adjacent to 12' sapcing thinned in 2005.
Unit 22-9-16
69 acres
1:1,305


TREATMENT PRESCRIPTION:
- Matrix spacing: 13' (18' around NF, DF, and WWP)
- Diameter Limit: 6"
- Species to cut: SF (cut no other species)
- Contractor-marked Skips (105' in diameter shown in blue): 2
T22N, R09E, S09
T22N, R09E, S16
Unit 83.2
12 acres
2012 Restoration Thinning Sites: Unit 83.2
Roads
Decommissioned
2012 RT Pool
RT Completed
Old-Growth Forest
City Ownership
SITE DESCRIPTION:
- Dominated by Pacific silver fir with some noble fir.
- Slope to 70%
- Higher elevation.
- Some larger trees (thin from below).
- Upper ridge.
LANDSCAPE:
- Adjacent to OG.
- Patchy landscape.
1:1,919


2012 Restoration Thinning Sites: Unit 117
Roads
Decommissioned
2012 RT Pool
RT Completed
Old-Growth Forest
City Ownership
TREATMENT PRESCRIPTION:
- Matrix spacing: 14'
- Diameter limit: 6"
- Species to cut: SF (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 5
Unit 104
201 acres
Unit 117
23 acres
T21N, R09E, S01
SITE DESCRIPTION:
- Dominated by Pacific silver fir.
LANDSCAPE:
- From ridge-top to mid-slope.
- Patchy landscape.
1:2,582


2012 Restoration Thinning Sites: Unit 127E
Roads
Decommissioned
2012 RT Pool
RT Completed
Old-Growth Forest
City Ownership
TREATMENT PRESCRIPTION:
- Matrix spacing: 13'
- Diameter limit: 6"
- Species to cut: SF (cut no other species)
- Contractor-marked skips (105' in diameter shown in blue): 4
Unit 127E
19 acres
T21N, R09E, S01
SITE DESCRIPTION:
- Dominated by Pacific silver fir.
LANDSCAPE:
- From ridge-top to mid-slope.
- Patchy landscape.
1:2,258

5.0 Lessons Learned

- Ramon Coronel's crew took longer than expected to compete the first two units (56.1 and 82) in August, which was reflected in his invoice being $2,180.50 over the not-to-exceed amount. Their work in October/November, however, was significantly under the NTE amount, allowing Ramon to recoup the previous shortfall.
- Strings to measure tree diameter were made available to each member of the crew whenever they moved to a unit that had a new diameter limit. There were no issues with cutting trees over the limit.
- During the first day of thinning in a snowstorm in October, one of the thinners cut his knee requiring 10 stitches. He is OK, but thinners do not like to work in the snow.
- After finding several noble firs cut in the thinning units, Chris Raynham gave the thinning crew a short tutorial on the differences between silver and noble firs. No additional work was required.
- Streams were again buffered with no-cut areas of 25-50' on either side. This conservative approach was used to mitigate potential erosion on steep ground and to simplify the administration of the contract.
- Ramon Coronel worked on each unit this season, either as the primary contractor or as a subcontractor for Ramirez. His vehicles do not have the appropriate trailer hitch for the sanican, so watershed staff was responsible for its transport.
- The "Black n' Red" log book was maintained during the short fall season. Entries were not made every day, but the information is useful to remember later in the process.

6.0 Basic Status of RT Program in the CRMW

2012 was the 13th year of the RT program under the CRW-HCP. Prior to the adoption of the CRW-HCP in 2000, SPU supported a pre-commercial forest thinning program analogous to RT, albeit with different goals and prescriptions. Table 3 summarizes the acres of young forest treated under these programs.

Table 3. Summary of the RT program in the CRMW.

Management	Year	Acres Treated	Treatment Summary						
			# Subunits	Thinning Spacing (ft)	Maximum Diameter Limits	Skips	Gaps	Slash Treatment	Girdling
Pre-HCP	1995	590	28	12	Y	N	N	N	N
	1996	671	7	13	Y	N	N	N	N
	1997	455	2	6-13	Y	N	N	N	N
	1998	166	2	13	Y	N	N	N	N
	1999	0							
CRW-HCP	2000	499	8	13	Y	N	N	N	N
	2001	1,282	9	15	Y	N	N	N	N
	2002	1,372	8	15	Y	N	N	N	N
	2003	1,154	14	12-15	Y	N	N	N	N
	2004*	1,017	16	13-16	Y	N	N	Y	N
	2005	683	17	12-18	Y	N	Y	Y	N
	2006**	362	13	11-17	Y	Y	Y	Y	N
	2007	637	25	12-18	Y	Y	Y	Y	N
	2008	699	43	8-18	Y	Y	Y	Y	Y
	2009	598	19	10-18	Y	Y	Y	Y	Y
	2010	573	27	12-18	Y	Y	Y	Y	N
	2011	482	20	13-18	Y	Y	N	Y	Y
	2012	171	8	13-18	Y	Y	Y	N	N
Total	Non-HCP	2,299	*Includes 370 acres (Selleck and Foothills) funded by BPA (non-HCP).						
	HCP	9,112	**Includes 47 acres (Trillium) funded by BPA (non-HCP).						
Grand Total		11,411	=sum(						

Funding for the RT program is provided through the CRW-HCP for a total of 15 years. Original targets for this program included treating approximately 10,480 acres with a $2,620,000 budget. There are currently three years left in the stated program with an annual budget of $297,500 with roughly $150,000 for professional services and a target of approximately 1,368 acres. In 2013, the RT program will concentrate on the deferred units from 2012 and young forest stands at the higher elevations in the Lindsey Creek basin (213 road system) and the eastern end of the watershed (550 and 600 road systems) . Eight of the units have already been marked.